Interstellar polarization and extinction toward the hidden symbiotic star SU Lyn

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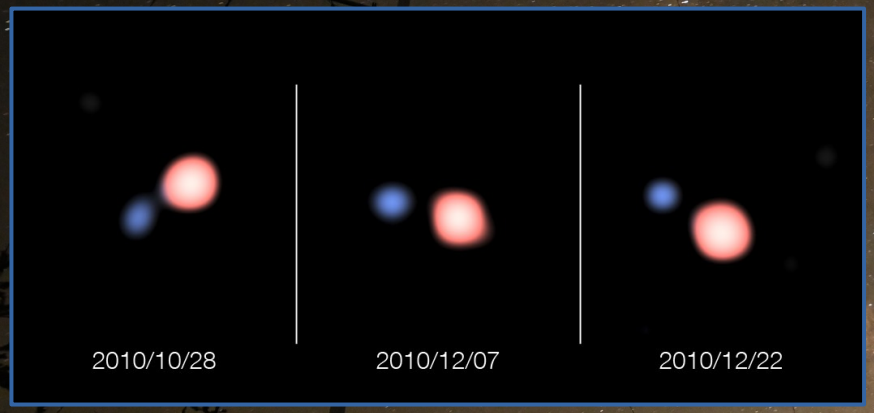
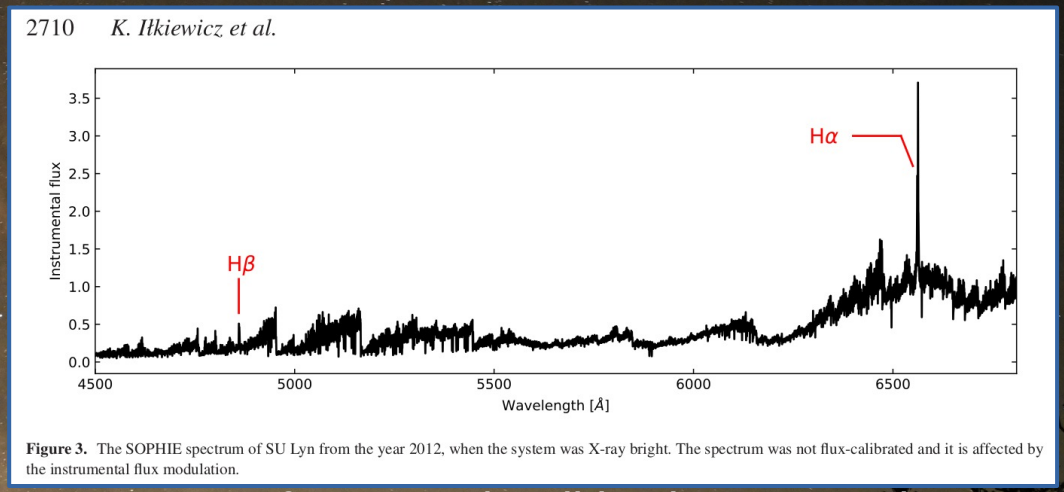
SU Lyn - a transient symbiotic star

The optical spectrum of a symbiotic star is a combination of the spectra of both the hot and the cool components.



Symbiotic star SS Lep
Image Credit: ESO/PIONIER/IPAG



Spectrum of SU Lyn (K. Iłkiewicz + 2022)

SU Lyn was discovered as a semi-regular variable star with a period of ~126 d by Kippenhahn (1955).

Mukai et al. (2016) identified SU Lyn with a hard X-ray source 4PBC J0642.9 + 5528 detected by the Swift satellite.

SU Lyn as a progenitor of a classical symbiotic star - K. Iłkiewicz + 2022 note that SU Lyn may evolve towards a stable, typical symbiotic star.

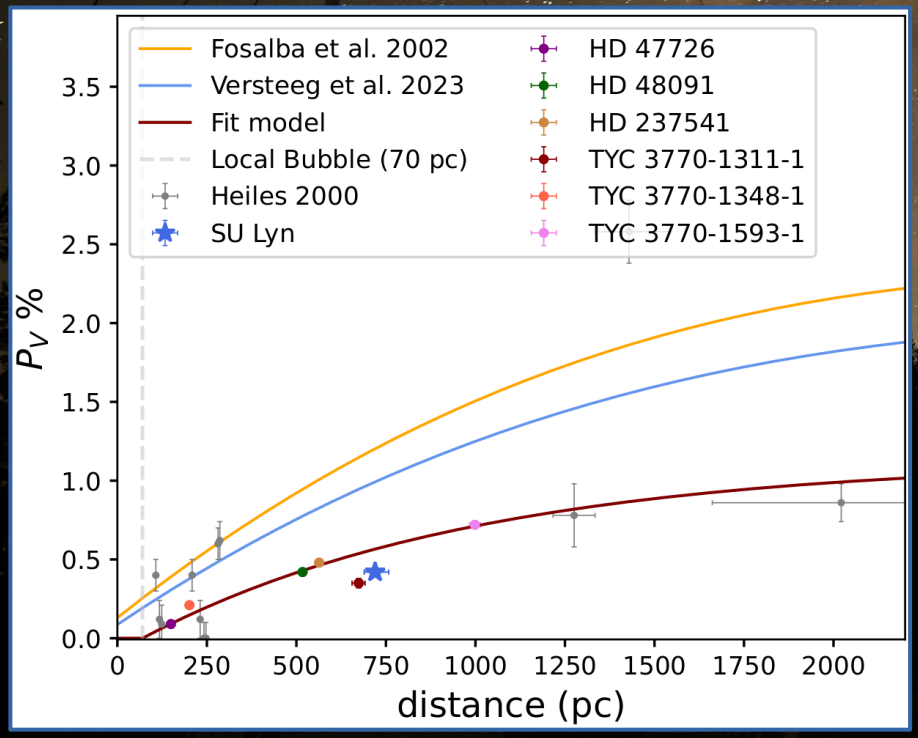
Interstellar polarization toward SU Lyn

Table 1. Observation log of SU Lyn and stars in its field. All observations were conducted on January 6, 2025.

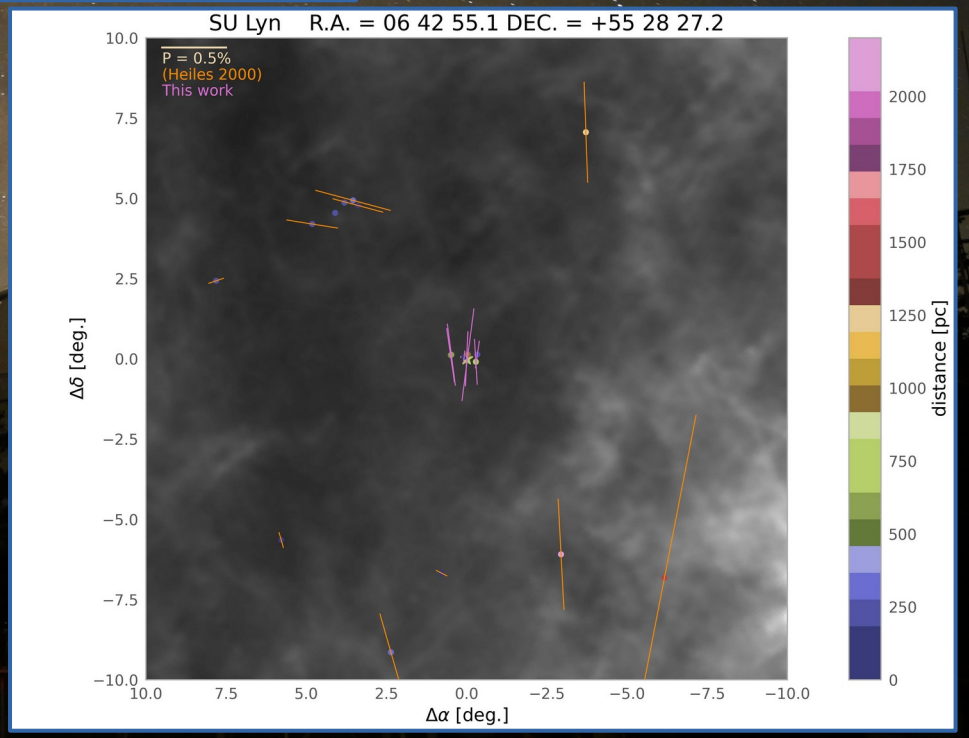
Object	UT	*Exp.*[a] [s]	Angular distance	*Distance*[b] pc	P_V (%)	$P.A._V$ [deg.]
SU Lyn	18:20	384	–	720^{+38}_{-30}	0.42 ± 0.02	177.4 ± 1.7
HD 47726	18:45	960	4.5’	150^{+1}_{-1}	0.09 ± 0.01	173.6 ± 3.5
TYC 3770-1593-1	19:14	2880	7.8’	999^{+15}_{-15}	0.72 ± 0.02	172.6 ± 0.8
TYC 3770-1348-1	20:16	1920	13.9’	201^{+1}_{-1}	0.21 ± 0.02	171.8 ± 3.2
HD 48091	21:01	640	18.2’	517^{+9}_{-11}	0.42 ± 0.01	8.2 ± 0.8
HD 237541	21:26	1920	17.9’	564^{+4}_{-4}	0.48 ± 0.01	7.4 ± 0.9
TYC 3770-1311-1	22:15	2880	11.3’	674^{+17}_{-19}	0.35 ± 0.03	3.5 ± 2.7

Note: [a] - Total exposure time; [b] Distance based on Gaia EDR3 (Bailer-Jones et al., 2021).

Nikolov + *in prep.*

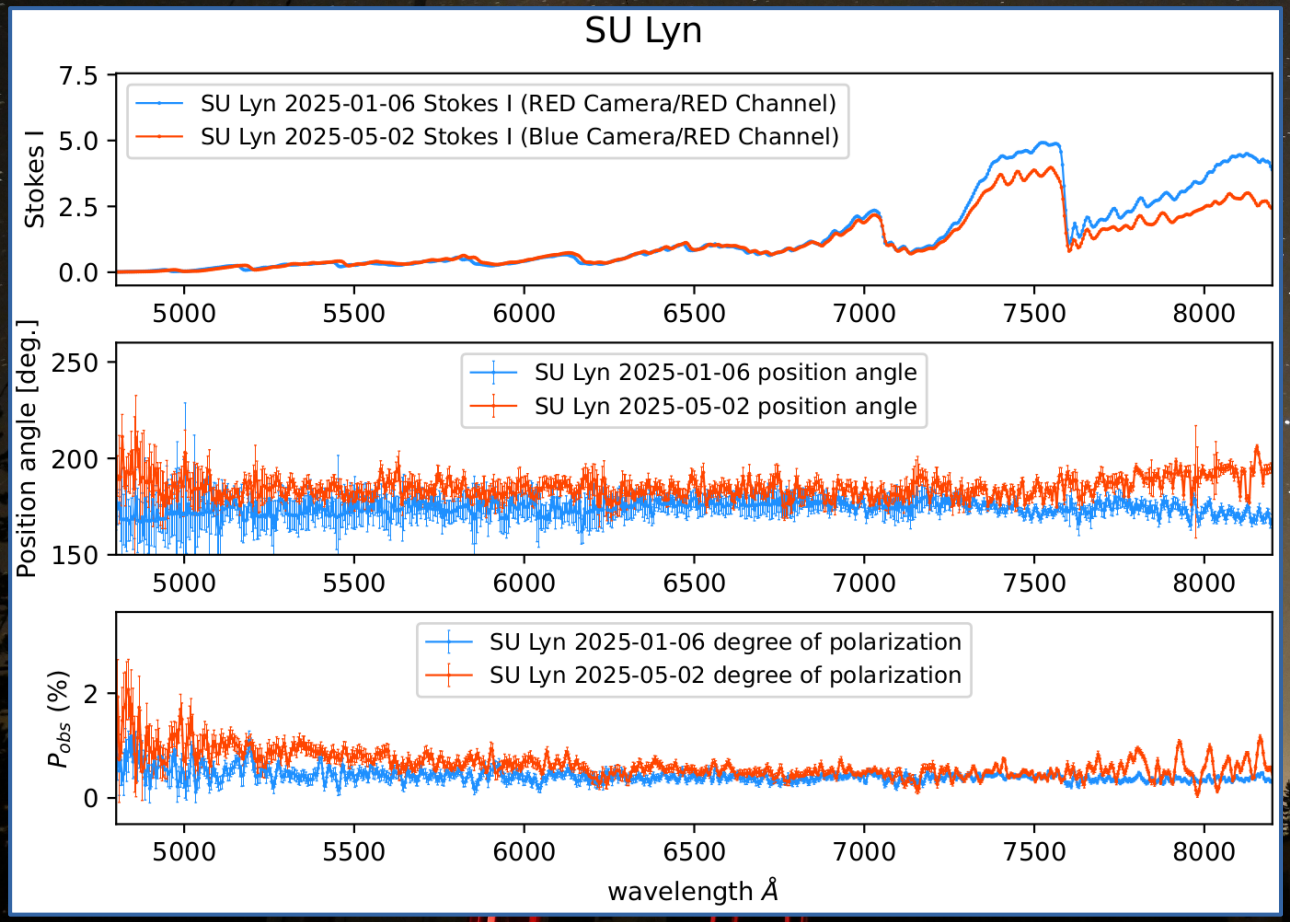


Polarization vs. distance. The orange and the blue lines represent the polarization vs. distance relationship taken from (Fosalba et al., 2002) and (Versteeg et al., 2023), respectively.



The interstellar polarization of the field stars around SU Lyn (with orange,Heiles (2000)). The degree of polarization is proportional to the length of its bar. The horizontal bar of the top right presents 0.5% polarization. The P.A. of the stars of the direction of SU Lyn are similar to that observed in SU Lyn. The color of every star corresponds to its distance. The background image represents 100 μm dust emission maps (Schlegel et al.,1998).

SU Lyn – variable polarization?



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Observed Stokes I, position angl and degree of polarization of the hydden symbiotic star SU Lyn.

Acknowledgements
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